

## [Correspondence] A lesson from classic British literature

Article (Accepted Version)

Bove, Geoffrey M and Dilley, Andrew (2019) [Correspondence] A lesson from classic British literature. *The Lancet*, 393 (10178). pp. 1297-1298. ISSN 0140-6736

This version is available from Sussex Research Online: <http://sro.sussex.ac.uk/id/eprint/82912/>

This document is made available in accordance with publisher policies and may differ from the published version or from the version of record. If you wish to cite this item you are advised to consult the publisher's version. Please see the URL above for details on accessing the published version.

### **Copyright and reuse:**

Sussex Research Online is a digital repository of the research output of the University.

Copyright and all moral rights to the version of the paper presented here belong to the individual author(s) and/or other copyright owners. To the extent reasonable and practicable, the material made available in SRO has been checked for eligibility before being made available.

Copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

## A Lesson from Classic British Literature

Geoffrey M. Bove, PhD<sup>1</sup> and Andrew Dilley, PhD<sup>2</sup>

<sup>1</sup>University of New England  
11 Hills Beach Rd.  
Biddeford ME USA

<sup>2</sup>Brighton and Sussex Medical School  
University of Sussex  
Falmer  
Brighton, BN1 9PS UK

### Corresponding Author:

Geoffrey M. Bove  
University of New England  
Dept. Biomedical Sciences  
11 Hills Beach Rd.  
Biddeford ME 04046 USA [gbove@une.edu](mailto:gbove@une.edu)  
+1 207 590 8949

In The Mill on a Floss,<sup>1</sup> George Eliot wrote *“But the immediate presence of this disgrace was so much keener an experience to Tom than the worst form of apprehension, that he felt at this moment as if his real trouble had only just begun: it was a touch on the irritated nerve compared with its spontaneous dull aching”*.

The author used current understandings of physical pain symptoms as a metaphor for personal psychological suffering. Tom knew that his father had lost their property, and carried that embarrassment with him (spontaneous dull aching). In the scene, a bailiff was in the parlor to liquify assets (the touch on the irritated nerve). These descriptions will ring familiar to many patients today, but we have only recently discovered their neurobiological mechanisms.

Understanding the mechanisms should help with the diagnosis and thus treatment of radiating pain symptoms that are present in most cases of cervical and lumbar radiculopathies, repetitive motion disorders, and complex regional pain syndromes, conditions that more often than not have no sign of nerve injury.

Both sensory experiences alluded to in the quote can be explained by the effects of nerve inflammation, called neuritis. During neuritis, chemical and mechanical stimuli of the affected nerve lead to the generation of nociceptor action potentials (and pain). The presence of inflammation and constituent inflammatory mediators leads to tonic discharge,<sup>2</sup> predicted to be perceived as a spontaneous dull ache. Mechanical stimulation of the inflamed nerve also leads to nociceptor discharge,<sup>3</sup> predicted to be perceived as “a touch on the irritated nerve”. It appears that the common mechanism of these axonal changes is the interference of axoplasmic transport, which is the mechanism by which sensory transductive channels are conveyed to the receptive terminals of neurons. During neuritis, the accumulation of these channels occurs on the axon, creating ectopic receptive fields.<sup>2,4,5</sup> Both perceptions would be felt distally to the inflamed site.

These changes form the basis for some of our nerve-related clinical tests, such as the straight leg raise. This test mechanically stimulates the sciatic nerve. Radiating pain evoked by the straight leg raise is almost certainly due to axonal mechanical sensitivity. In these patients, palpating or tapping the nerve (Tinel’s test) will cause radiating symptoms as well. Including focal neuritis as a diagnostic possibility could refine the treatment approaches for many

patients with radiculopathies, repetitive motion disorders, and complex regional pain syndromes, and others who present with symptoms that are suspicious of nerve damage but who do not have definite findings upon routine examination.

## References

1. Eliot G. *The Mill on the Floss*. Edinburgh: William Blackwood and Sons; 1860.
2. Govea RM, Barbe MF, Bove GM. Group IV nociceptors develop axonal chemical sensitivity during neuritis and following treatment of the sciatic nerve with vinblastine. *J Neurophysiol* 2017; **118**(4): 2103-9.
3. Bove GM, Ransil BJ, Lin HC, Leem JG. Inflammation induces ectopic mechanical sensitivity in axons of nociceptors innervating deep tissues. *J Neurophysiol* 2003; **90**: 1949-55.
4. Dilley A, Richards N, Pulman KG, Bove GM. Disruption of fast axonal transport in the rat induces behavioral changes consistent with neuropathic pain. *J Pain* 2013; **14**(11): 1437-49.
5. Dilley A, Bove GM. Disruption of axoplasmic transport induces mechanical sensitivity in intact rat C-fibre nociceptor axons. *Journal of Physiology* 2008; **586**(Pt 2): 593-604.

## Declaration of Interest

There are no conflicts of interest.